

63 which is provided with the separated recording/reproducing magnetic head of the embodiment mentioned above. The suspension 62 is provided with a lead 64 which is for writing and reading signals, and the lead 64 is electrically connected to each electrode in the separated recording/reproducing magnetic head as incorporated in the head slider 63. In the drawing, 65 are electrode pads in the magnetic head assembly 60.

The magnetic head assembly 60 of the illustrated type is mounted on a magnetic recording/reproducing system such as a magnetic disc system or the like, for example, as in Fig. 47. Fig. 47 shows the outline structure of a magnetic disc system 50 incorporating a rotary actuator.

As illustrated, the magnetic disc 51 is fitted to a spindle 52, and is rotated by a motor (not shown) that responds to the control signal from a driving system control source (not shown). The magnetic head assembly 60 is so mounted on the system 50 that the head slider 63 as fitted to the tip of the suspension 62 could float above the magnetic disc 51 for the intended information recording and reproduction. While the magnetic disc 51 is rotated, the medium-facing site (ABS) of the head slider 63 is held above the magnetic disc 51 via a predetermined floating distance (from 0 to 100 nanometers).

The actuator arm 61 of the magnetic head assembly 60 is connected to a voice coil motor 51 which is one type of a

linear motor. The voice coil motor 53 comprises a driving coil (this is coiled in the bobbin part of the actuator arm 61 and is not shown herein) and a magnetic circuit. The magnetic circuit comprises facing permanent magnets and facing yolks all disposed to sandwich the driving coil therebetween. The actuator arm 61 is held by ball bearings (not shown) as disposed in two sites, upper and lower sites of the fixed shaft 54, and is rotatable and slidale by the power of the voice coil motor 53.

The above is to exemplify one embodiment of the invention for separated recording/reproducing magnetic heads. Not limited to only such heads, the magnetoresistance effect device of the invention is applicable to any other head structures, for example, to an integrated recording/reproducing magnetic head that comprise one and the same magnetic yolk for both the recording head and the reproducing head. Still not limited to only magnetic heads, the magnetoresistance effect device of the invention is further applicable to any other magnetic memory systems such as magnetoresistance effect memories (MRAM), etc.

The invention is described in more detail with reference to the following Examples, in which the samples produced were tested and analyzed for their characteristics.

Example a:

In Example a, produced was a spin valve film of

5nanometer Ta/1 nm Au/1nm Cu/4 nm CoFe/2.5 nm Cu/2.5 nm CoFe/7 nm IrMn/5 nanometer Ta, in a DC magnetron sputter. The vacuum degree in the sputter was at most 1×10^{-7} Torr, in which the argon pressure was from 2 to 10 mTorr. In fabricating magnetic heads, the film is formed on the Al_2O_3 gap on an AlTiC substrate. It has been confirmed that the properties of the film do not vary.

The spin valve film had an MR ratio of 9.6 % in the as-deposited condition, but after having been annealed at 250°C for 4 hours in a magnetic field of 5 kOe, its MR ratio was still 9.0 %. The magnetostriction in the film was on the order of at most $\pm 10^{-6}$. H_k of a film sample having been annealed in a magnetic field applied in the direction of the easy axis is defined as saturation H_k of the film sample. H_k of the film produced herein was about 8 Oe and was small. This support the soft magnetic characteristics of the film. H_c of the film in the easy axis direction fell between 0 and 3 Oe, and was small.

In the film, the laminate film of Au/Cu is the MR-improving layer. In the interface between Au and Cu, formed is their alloy. In the interface between Cu and CoFe, formed is no solid solution. In the interface between Ta and Au, formed is their solid solution. However, since the thickness of the laminate of Au/Cu is much longer than the electron wavelength, the electron reflection on the interface is